CLAIMS:

1. A method of producing a nickel article by nickel vapor deposition, comprising the steps of:

providing a hollow multi-part mandrel having interior wall portions defining at least a portion of the exterior surface of a nickel article to be produced;

purging the hollow multi-part mandrel of oxygen;

heating said multi-part mandrel interior wall portions to a temperature sufficient to deposit nickel thereon in the presence of nickel carbonyl vapor;

passing nickel carbonyl vapor through the heated hollow multi-part mandrel to produce said nickel article;

purging the interior of the nickel article and the multi-part mandrel of nickel carbonyl vapor; and

removing the nickel article from the mandrel.

2. A method as claimed in claim 1 wherein the multi-part mandrel interior wall portions are heated to at least 165°C in areas where it is desired to deposit nickel.

3. A method as claimed in claim 1 wherein the multi-part mandrel interior wall portions are not heated above 130°C in areas where nickel is not desired to be deposited.

4. A method as claimed in claim 1 wherein portions of the multi-part mandrel interior wall portions are heated to different temperatures to obtain different wall thicknesses of deposited nickel in different areas of the nickel article.

5. A method as claimed in claim 1 and further comprising the step of mounting an additional component on the interior wall portions to be encapsulated in nickel during the deposition process.

6. A method as claimed in claim 1 wherein the nickel carbonyl gas is passed through the heated hollow multi-part mandrel until the deposited nickel is at least 0.05 mm (0.002 inches) in thickness.

7. A method as claimed in claim 1 wherein the nickel carbonyl vapor is mixed with carbon monoxide to vary the hardness of the nickel deposited.

8. A method as claimed in claim 1 wherein the nickel carbonyl vapor is mixed with carbon monoxide to vary the deposition rate of the nickel deposited.

9. A method as claimed in claim 7 wherein the amount of carbon monoxide mixed with the nickel carbonyl vapor is varied during the deposition process.

10. A method as claimed in claim 1 wherein the temperature of the multi-part mandrel interior wall portions is set to produce a nickel deposition rate of about 0.25 mm (0.01 inches) per hour.

11. A method as claimed in claim 1 wherein the temperature of the multi-part mandrel interior wall portions is varied during the deposition process to vary the rate of deposition of nickel.

12. A method as claimed in claim 2 wherein portions of the multi-part mandrel interior wall portions are heated to different temperatures to obtain different wall thicknesses of deposited nickel in different areas of the nickel article.

13. A method as claimed in claim 8 wherein the amount of carbon monoxide mixed with the nickel carbonyl vapor is varied during the deposition process.

14. Apparatus for producing nickel articles by nickel vapor deposition, comprising:

a first mandrel member including a wall having a first mandrel surface defining partially a nickel article to be produced, the first mandrel member also having a first parting line surrounding the first mandrel surface;

a second mandrel member including a wall having a second mandrel surface defining an additional portion of said article to be produced, the second mandrel member having a second parting line surrounding the second mandrel surface and being configured to mate with the first parting line to form an enclosure defining said article and permitting removal of said article upon opening of said mandrel members;

heating means mounted in the mandrel members for heating said first and second mandrel surfaces to a predetermined temperature; and

at least one inlet diffuser and at least one outlet diffuser mounted in the mandrel members for the passage of vapor through said enclosure.

15. Apparatus as claimed in claim 14 wherein the number of inlet diffusers is twice the number of outlet diffusers.

16. Apparatus as claimed in claim 14 wherein the inlet diffusers have outlet openings directed away from said mandrel surfaces.

17. Apparatus as claimed in claim 16 wherein the diffuser outlet openings are between 4 mm and 6 mm in diameter.

18. Apparatus as claimed in claim 17 wherein the diffuser outlet openings are about 4.7 mm in diameter.

19. Apparatus as claimed in claim 14 and further comprising encapsulations releasably mounted on the mandrel surfaces to be encapsulated in nickel during the deposition process.

20. Apparatus as claimed in claim 19 wherein said encapsulations are in the form of threaded members having female threaded openings adjacent to the mandrel surfaces.

21. Apparatus as claimed in claim 14 wherein one of the mandrel surfaces has a protrusion extending toward but spaced from an adjacent mandrel surface to form a

gap therebetween, the spacing being such that deposited nickel bridges said gap during the deposition process.

22. Apparatus as claimed in claim 19 wherein said encapsulations are in the form of threaded members having male threaded projections extending through the walls of the mandrel members.

23. Apparatus as claimed in claim 19 wherein the encapsulations are in the form of a tubular member having end portions sealingly mounted in the mandrel members to prevent nickel carbonyl gas from entering the tubular member during the deposition process.

24. Apparatus as claimed in claim 14 and further comprising a silicone layer covering at least a portion of the mandrel surfaces, the silicone layer defining a predetermined contour or texture.

25. Apparatus as claimed in claim 15 wherein the inlet diffusers have outlet openings directed away from said mandrel surfaces.